



National Air Quality Forecasting: Status and Plans



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Dr. Jack Hayes
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National Air Quality Forecasting:

Vision and Strategy



Vision

National Air Quality Forecast System which provides the US with ozone, particulate matter and other pollutant forecasts with enough advance notice to take action to prevent or reduce adverse effects

Strategy

Work with EPA, State and Local Air Quality agencies and private sector to develop end-to-end air quality forecast capability for the Nation



Outline



- NOAA and NWS***
- NOAA and AIR QUALITY***
- NOAA + EPA***
- Path to Operational Air Quality Forecasts***
- Next steps: Challenges and Opportunities***



NOAA

Vision, Mission

VISION

- **To move NOAA into the 21st Century scientifically and operationally, in the same interrelated manner as the environment that we observe and forecast, while recognizing the link between our global economy and our planet's environment.**

MISSION

- **To understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet the Nation's economic, social, and environmental needs.**



National Oceanic and Atmospheric Administration

**National Marine Fisheries Service
(NMFS)**

**National Ocean Service
(NOS)**

**National Weather Service
(NWS)**

Data and Information Service (NESDIS)

**Office of Oceanic and
Atmospheric Research (OAR)**



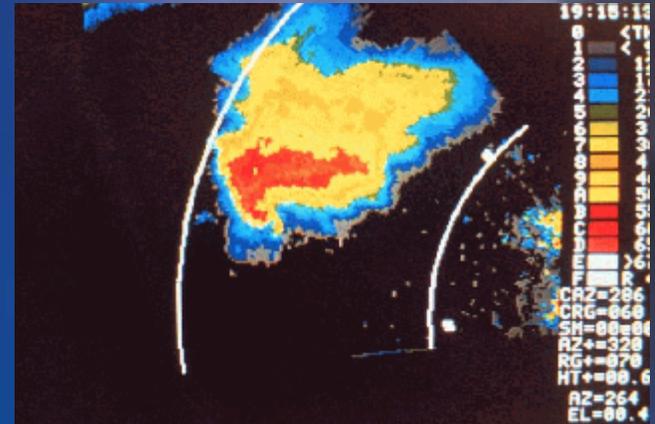


National Weather Service

Our Mission



- Provide weather, water and climate forecasts and warnings
 - *To America*
 - *To protect life and property*
 - *To enhance the national economy*



- Provide a national information database for
 - *Government agencies*
 - *Private sector*
 - *Public*
 - *Global community*



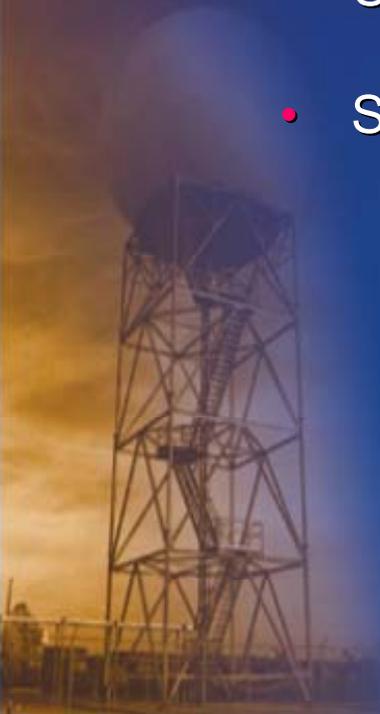


National Weather Service

Why We're Here



- Basic Source of Weather Information for the Country
- High Impact Government Agency
- U.S. Severe Weather Prone— Protect Life and Property
- Significant Economic Benefits to the Nation

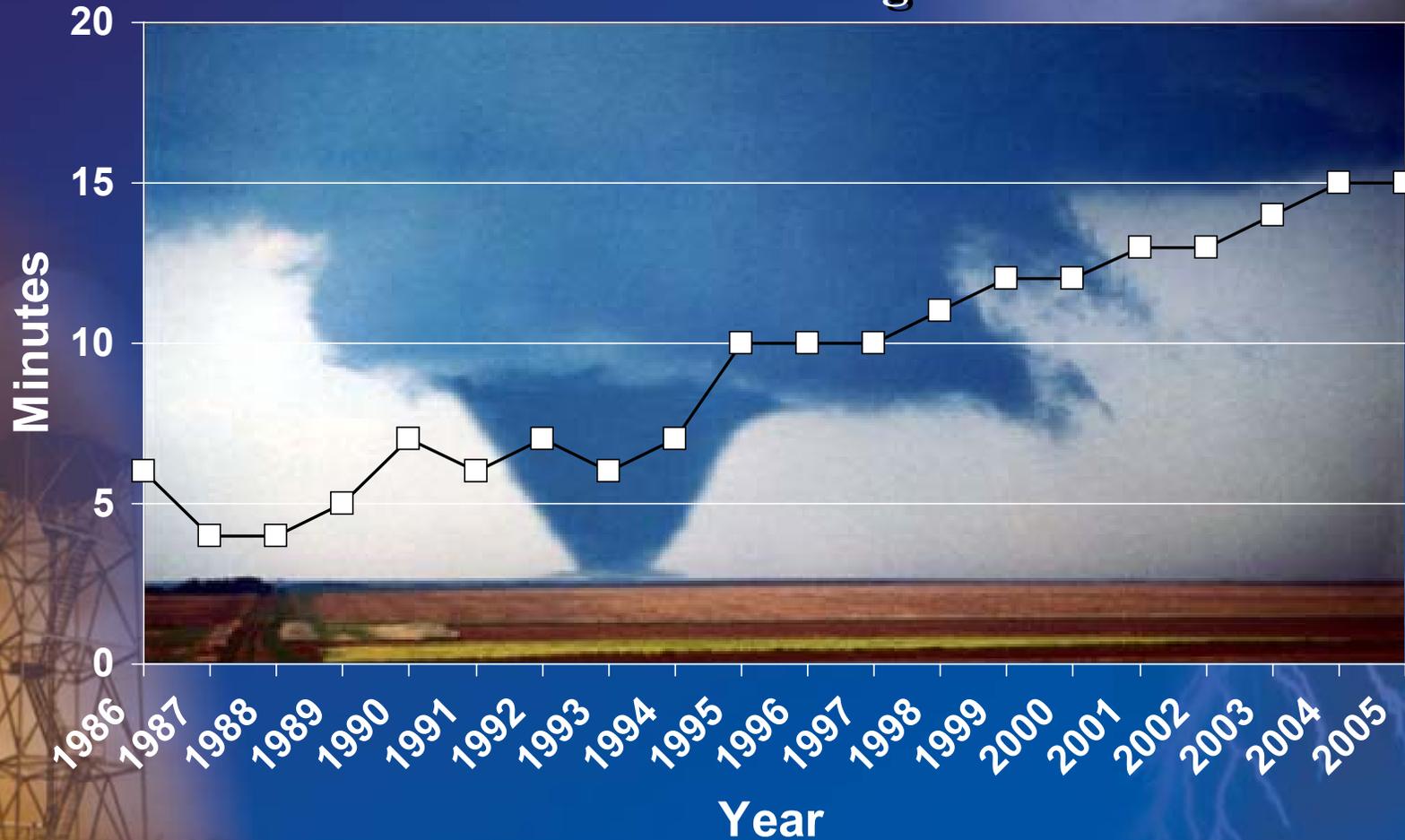




National Weather Service

*Technologies and Training are
Improving Our Service*

Tornado Warnings



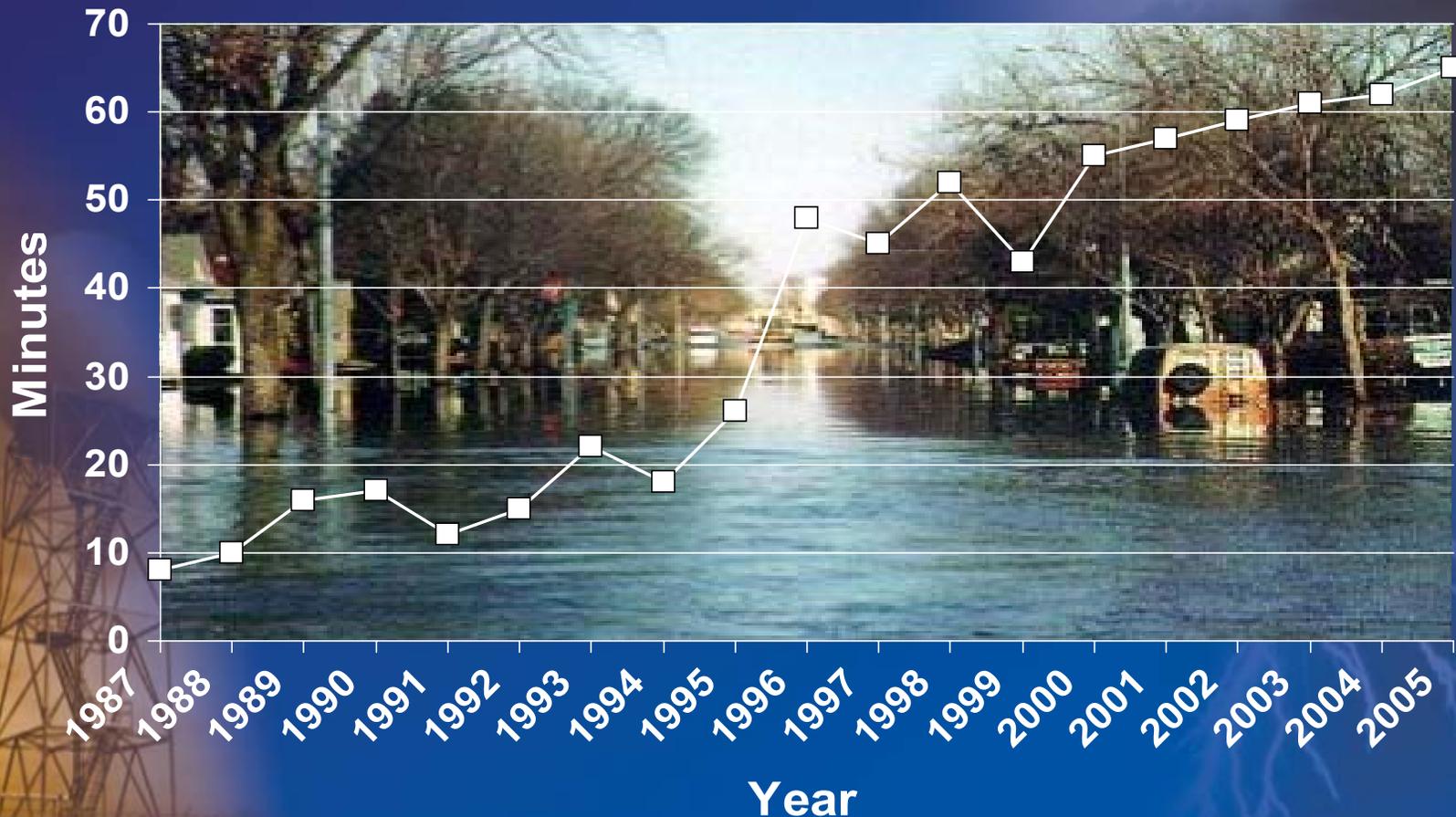


National Weather Service

*Technologies and Training
are Improving Our Service*



Flash Flood Warnings





National Centers for Environmental Prediction



IBM SP at Bowie Computer Center in Bowie, MD

- Ingests over 1.5 million observation reports daily
- Produces 52 gigabytes of information daily
- Transmits 81,000 products each day
- Global Models (Weather, Ocean, Climate)
- Domestic Models (Aviation, Severe Weather)
- Hazards Models (Hurricane, Volcanic Ash)



NOAA and Air Quality



Congressional interest

H.R. 4 Energy Policy Act of 2002 (Senate Amendment)

- *S. 517, SA 1383, Forecasts and Warnings:*

“The Secretary of Commerce, through the Administrator of the National Oceanic and Atmospheric Administration, shall, in order of priority as listed in section (c) establish a program to provide operational air quality forecasts and warnings for specific regions of the United States...”

Constituent interest

- *Air Quality (AQ) managers, public health officials, private weather sector partners urge NOAA to provide AQ forecasts*

Science is mature

- *Ozone forecast models demonstrated in lab -- others in development*
- *Other nations (Canada, Australia) have AQ forecast capability*



NOAA and Air Quality



NOAA and EPA helped develop AQ expertise for forecasting:

- *Ozone forecasting demonstrated in laboratory prototypes*
- *Atmospheric modeling tools developed/demonstrated in routine assessment of air pollutants*

NOAA/NWS develops and runs the NWP models at NCEP that guide National Weather Service forecasts

Linking AQ forecast models to NCEP's NWP models will provide consistent, nationwide basis for AQ forecast guidance.



NOAA and EPA

Partners for Air Quality



EPA

- ***National Emissions Inventory***
- ***National AQ databases***
- ***State, Local AQ manager coordination***

NOAA

- ***Nation's end-to-end weather forecasting***
- ***Weather and AQ R&D***
- ***AQ Operational support, infrastructure***



National Air Quality Forecasting

Planned Capabilities



Initial: 1-day forecasts of ozone (O₃)

- *Develop and validate in Northeastern US within 2 years*
- *Deploy Nationwide within 5 years*

Intermediate (5-7 years):

- *Develop and deploy nationwide capability to forecast particulate matter (PM) concentration*
 - *Particulate size \leq 2.5 microns*

Longer range (within 10 years):

- *Extend air quality forecast range to 48-72 hours*
- *Include broader range of significant pollutants*

National Air Quality Forecast

Capability:

Major Components



Weather Model: NCEP's Mesoscale NWP

NOAA

Air Quality Forecast Model: CMAQ

NOAA/EPA

National Emissions Inventory:

EPA

Supporting Comms/IT:

NOAA/EPA



EPA's Role



- **Compile, maintain, and provide current National Emissions Inventory to NOAA**
 - *Consists of State/Local and federal inventories; including fixed point/area and mobile sources, biogenic sources*
- **Compile and maintain National AQ Databases**
 - *Includes ozone observations*
 - *Current data (ozone and other precursors) delivered to NOAA*
- **Compile databases for State/Local AQ Forecasts**
- **Makes AQ Forecasts available to States/Locals and private sector**
 - *Produce AQI and links to public health information*
- **Provide AQ forecasting support for all products**
 - *Staffs required customer help desk*



NOAA's Role



- **Develop and integrate tools for weather and AQ forecasting**
 - *Eta/WRF*
 - *CMAQ*
 - *Verification and Archiving*
 - *Underlying IT for NOAA side of interface*
- **System operations: AQ prediction models driven by NCEP weather prediction models**
- **Provide gridded AQF forecasts to EPA twice daily**
- **Provide gridded AQF forecasts on NWS servers**
 - *available for public and private sector users to “pull”*
- **Verification**
- **Archiving**
- **Customer Outreach/Feedback**

National Air Quality Forecast Capability

Initial Operating Capability



1-Day ozone forecasts: Target deployment for NE US - - FY 04

- ***1-hr and 8-hr avg O₃ levels: categories for EPA and in parts per billion (ppb)***
- ***Threshold: Ground levels.***
 - **May expand to above-ground levels if sufficient ozone observations can be acquired and exploited**
- ***Forecasts produced during ozone season***



Proposed AQF Northeast Domain



December 2002



National Air Quality Forecast Capability

Initial Operating Capability



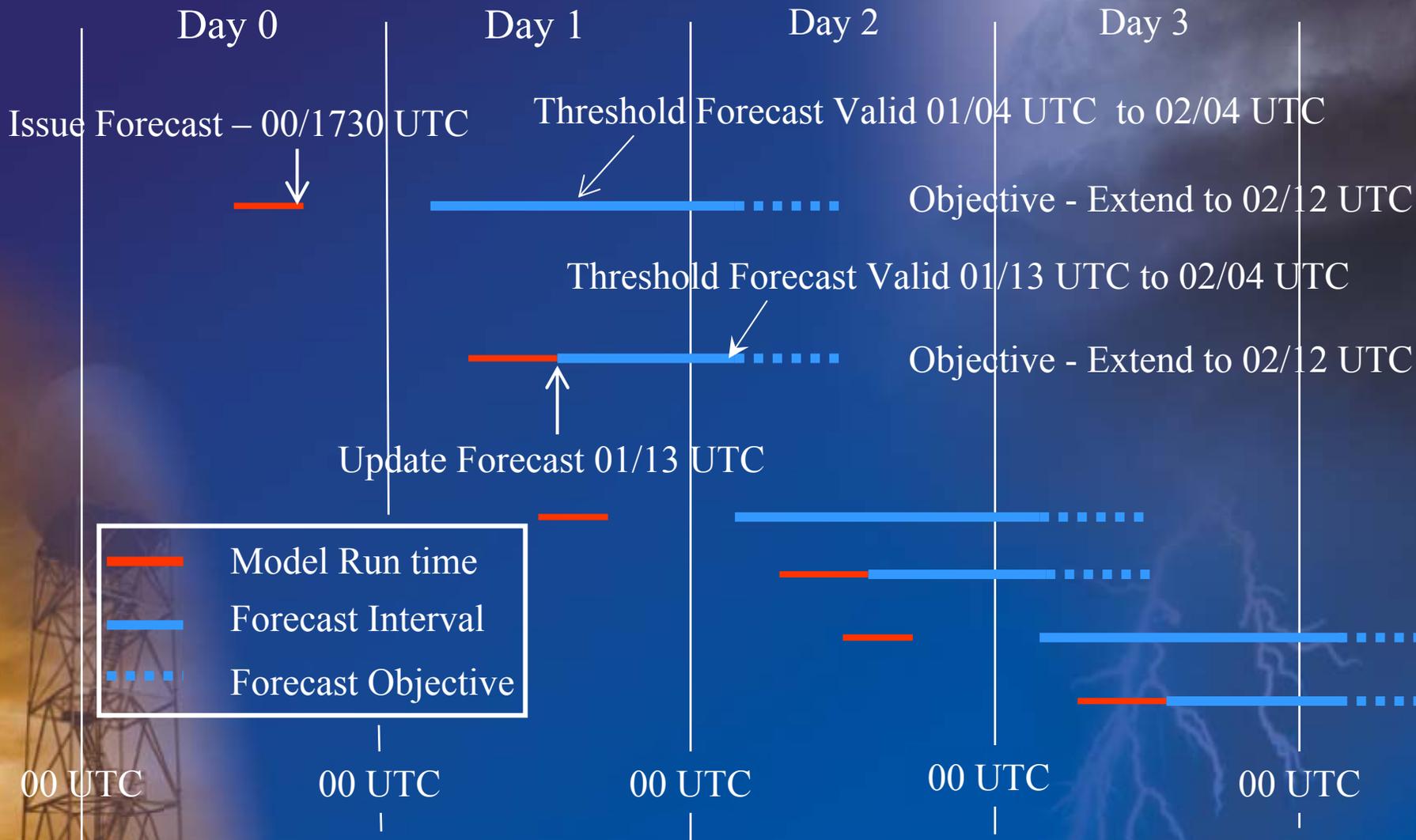
1-Day ozone forecasts:

- *Delivered 2X daily*

- Primary forecasts for following day: delivered by 1730 UTC
 - *valid for 24 hours through 4 UTC, day 3*
- Update forecasts for current day: delivered by 1300 UTC
 - *valid for 15 hours through 4 UTC, day 2*
- Threshold: through 4 UTC. Objective: through 12UTC



Air Quality Forecast Operations



National Air Quality Forecast Capability

Initial Operating Capability



1-Day ozone forecasts:

– ***Accuracy target (TBR):***

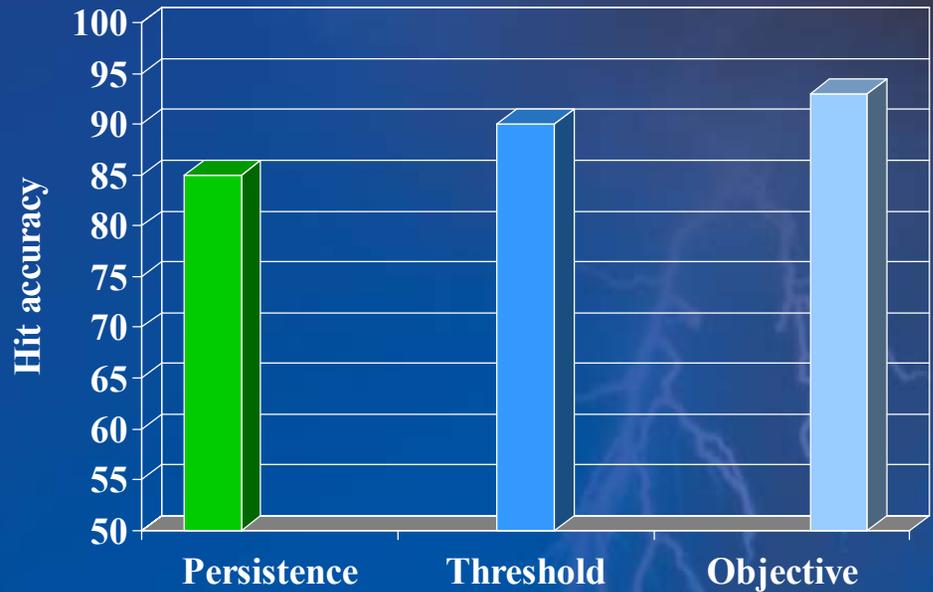
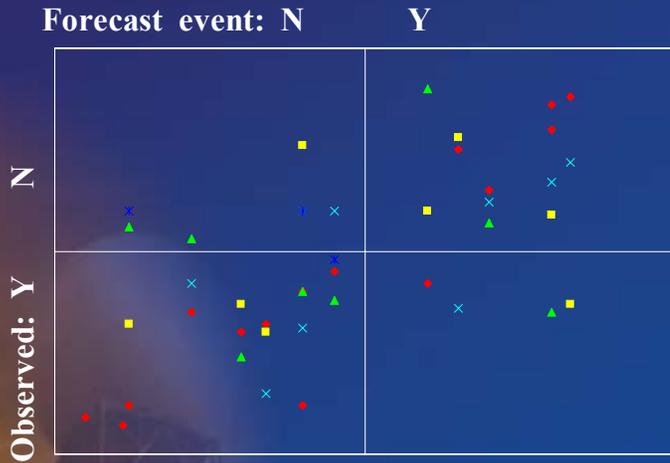
- **Threshold: critical level “hit accuracy” predicted on 90% of days**
- **Propose: Objective: critical level “hit accuracy” predicted on 93% of days**
- **Persistence forecast “hit accuracies” are ~85%**

– ***Finalize target by FY03***

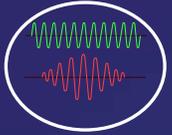
National Air Quality Forecast Capability Accuracy Targets



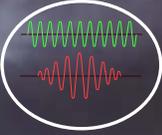
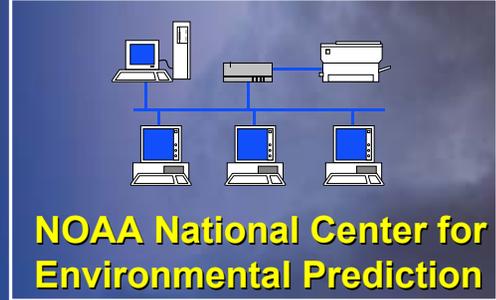
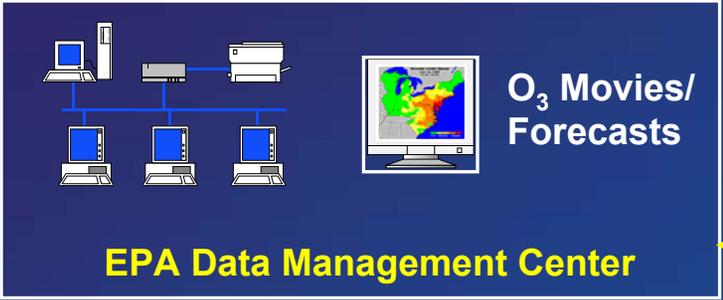
Hit accuracy



IOC: NOAA's IT Links...

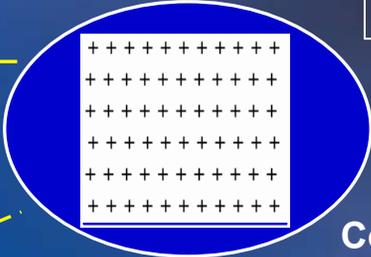


AQ Data from S/L Agencies



Weather Obs

EPA Emissions Inventory



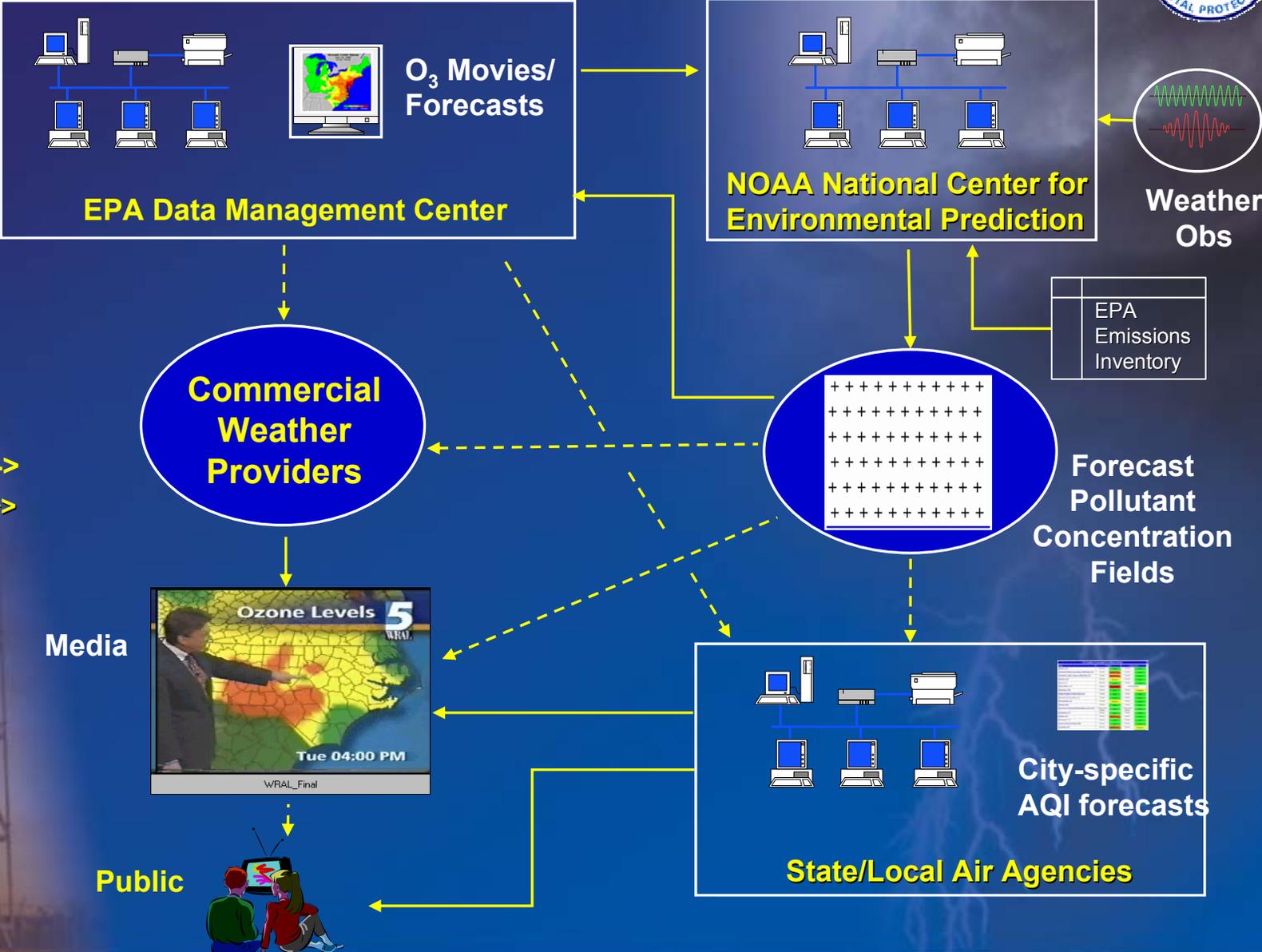
Forecast Pollutant Concentration Fields

Data "pull" - - ->
Data "push" ->

Media



Public





National Air Quality Forecast Capability



Beyond IOC: Goals/Targets to FY 12

- **Near-Term: Initial Operating Capability (IOC)**
- **Mid-Term (2-5 yrs): Initiate nationwide forecasting**
- **Longer-term (5-10 yrs): Enhanced capabilities**

<i>Proposed Products</i>	<i>2-year Target</i>	<i>5-year Target</i>	<i>10-year Target</i>
Ozone forecasts	IOC 1-day forecasts: Northeast US	1-day forecasts for the Nation	Extend to day 2 and beyond
PM	R&D	1-day forecasts: Northeast US	1-day forecasts for the Nation
Extend to other pollutants		R&D	1-day forecasts



Challenges



- **Transition of R&D to Operations**
- **Extend ozone forecasts to PM**
- **Extend AQ forecasts further out in time**
- **Evaluate need for / best use of additional air chemistry observations for AQ forecasts**



Needs



- **Refine customer requirements**
 - *Continue state/local input; additional customer/stakeholder input*
 - *2004 test products*
 - *Follow-on actions*
- **Customer/stakeholder input**
 - *EPA National AQ Conference, Feb 2003*
 - *Annual constituent meetings*
 - *Other*
- **Customer outreach and evaluation**



Summary



- **Strong NOAA and EPA partnership to provide constituents with information generation, dissemination and interpretation services**
 - *EPA providing air quality information to State and Local users to meet needs of public for health protection and economic growth*
 - *NOAA providing science structure, forecast models and dissemination experience*
- **Pre-operational testing scheduled for summer, 2003 over Northeastern US**
- **Planning for Initial Operational Capability: ozone forecasts in 2 yrs**
 - *Experimental products: Summer 04*
- **Planned nationwide capability: ozone forecasts within 3-5 yrs**
 - *Particulate forecasts within 5-10 yrs*